
माण्ड — शब्दावली

(तीसरा पुनरीक्षण)

Starch — Glossary

(Third Revision)

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FOREWORD

This Indian Standard (Third Revision) was adopted by the Bureau of Indian Standards, after the draft finalized by the Foodgrains, Allied Products and Other Agricultural Produce Sectional Committee had been approved by the Food and Agriculture Division Council.

This standard defines the terms most frequently used, at present, in industries concerned with starch, including its derivatives and by-products.

This standard was originally published in 1992 as identical adoption of ISO 1227 : 1979 'Starch, including derivatives and by-products — Vocabulary'. The standard was subsequently revised in 1976 and 1979 to align with the revised versions of ISO standard.

ISO 1227 has since been withdrawn by ISO, Foodgrains, Allied Products and Other Agricultural Produce Sectional Committee, FAD 16, considering the importance of the subject decided to revise the standard and convert it to indigenous standard.

Through the current revision, various terminologies have also been updated in line with the latest technological development and practices prevailing in this sector.

The composition of the Committee, responsible for the formulation of this standard is given at Annex A.

For the purpose of deciding whether a particular requirement of this standard is complied with the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS 2 : 2022 'Rules for rounding off numerical values (*second revision*)'. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

Indian Standard

STARCH — GLOSSARY

(Third Revision)

1 SCOPE

This standard defines the terms most frequently used in industries concerned with starch, including derivatives and by-products.

2 CLASSIFICATION

The terms have been grouped according to the following classification:

2.1 General Terms

2.2 Source Materials

2.3 Technology

2.3.1 Industries

2.3.2 Processes and Manufacturing Terms

2.3.3 Auxiliary Materials

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2.4.1 Native Starches

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3 TERMINOLOGY

3.1 General Terms

3.1.1 Amylose — Amylose is defined as under:

- a) Polysaccharide constituent of starch, the macromolecules of which have a linear structure; and
- b) Industrial product consisting essentially of amylose which can be obtained by fractionation of a starch solution.

3.1.2 Amylolysis — Depolymerization of the starch macromolecule.

3.1.3 Amylopectin — Amylopectin is defined as under:

- a) Polysaccharide constituent of starch, the macromolecules of which have a branched structure; and

- b) Industrial product consisting essentially of amylopectin which can be obtained by fractionation of a starch solution.

3.1.4 Gelatinization — Process involving the transformation of starch into a starch paste.

3.1.5 Gelling — Solidification of an aqueous dispersion of gelatinized starch (frequently on cooling).

3.1.6 D-glucose — Aldose of the molecular formula $C_6H_{12}O_6$, of which several anomers exist, for example, α -D-glucose and β -D-glucose.

3.1.7 Maltose — Disaccharide of general formula $C_{12}H_{22}O_{11}$, composed of two molecules of D-glucose joined by 1, 4 links, whose systematic name is 4-O- α -D-glucopyranosyl-D-glucopyranose.

3.1.8 Starch — Carbohydrate occurring in granular form in the organs of certain plants, and corresponding to a polymer composed almost exclusively of anhydro- α -D-glucose units.

3.1.9 Starch Derivatives — Generic term for all products produced from native starch, modified starches, starch hydrolysis products.

3.1.10 Starch Granule — The form in which starch occurs in the plant cell.

3.1.11 Starch Paste — The viscous mass resulting from the swelling and the colloidal dispersion of starch in an aqueous medium (in the presence or absence of chemical reagents, at normal or elevated temperatures).

3.1.12 Pentosans — Polymeric carbohydrates almost entirely of anhydrous pentose units.

3.1.13 Retrogradation — Gradual and irreversible insolubilization of an aqueous dispersion obtained by gelatinization of starch or its derivatives, with the formation of a precipitate or gel according to concentration.

3.2 Source Materials

3.2.1 Broken Rice — Grains of rice (*Oryza sativa*) broken longitudinally or transversally during the processing of rice.

3.2.2 Farina Potato — Potatoes belonging to varieties characterized by a high content of starch.

3.2.3 Manioc or Cassava Root — Commercial name of the tuberous root of manioc (*Manihot utilissima*, *Manihot esculenta*).

3.2.4 Manioc or Cassava Flour — Powder obtained by dry grinding tuberous roots of manioc (*Manihot utilissima*, *Manihot esculenta*).

3.2.5 Manioc Root — Dried sections of the tuberous roots of manioc (*Manihot utilissima*, *Manihot esculenta*).

3.3 Technology

3.3.1 Industries

3.3.1.1 Dextrin(e) industry — The industry, the object of which is to manufacture dextrins.

3.3.1.2 Dextrin(e) plant — A factory where dextrins are produced.

3.3.1.3 Glucose industry — The industry, the object of which is to manufacture starch hydrolysis products.

3.3.1.4 Glucose plant — Factory for the production of D-glucose.

3.3.1.5 Starch industry — The industry, the object of which is to extract starch from starch-bearing materials.

3.3.1.6 Starch mill — Factory where starch is produced.

3.3.2 Processes and Manufacturing Terms

3.3.2.1 Aspiration — Operation carried out in a starch mill consisting of the removal of material by a current of air.

3.3.2.2 Bound starch — Starch which is not separable from cereal fibre by mechanical means during processing, in the presence of water.

3.3.2.3 Bound starch (in pulp) — Starch present in potato pulp (and, by extension, in the residual pulp of roots of other plants) not capable of being extracted by extra washing.

3.3.2.4 Brush strainer — Cylindrical wire sieve with internal, revolving brushes which keep the screen area clean.

3.3.2.5 Channel separator — Horizontal centrifuge furnished with a continuous supply of water during its operation.

3.3.2.6 Concentrated refinery liquor — Trade term used in the glucose industry to indicate crude or refined liquors resulting from saccharification and having undergone one stage of concentration.

3.3.2.7 Continuous decanter — Horizontal centrifuge with cylindrical-conical bowl and screw discharge of

solids, for the continuous separation of solids from a suspension in a liquid.

3.3.2.8 Converter — Apparatus for the acid and/or enzyme liquefaction and saccharification of starch.

3.3.2.9 Cross-linking — Process of producing cross-linked starch.

3.3.2.10 Crystallizer — Tank equipped with devices for agitation and temperature control for the crystallization of syrup to obtain, for example, dextrose.

3.3.2.11 Degerming — Operation carried out in a starch mill which consists of detaching and separating germ from the other constituents of the grains.

3.3.2.12 Degerming mill — Equipment intended for coarse grinding of steeped maize to liberate the germ.

3.3.2.13 Depolymerization — Reduction in the degree of polymerization of the starch or derivatives chains by physical, chemical or enzymatic action.

3.3.2.14 Dextrinization — Process of converting starch into dextrines.

3.3.2.15 Disintegrator — Peg mill in which the pegs can be cylindrical, conical or edged.

3.3.2.16 Drying cylinder; roller dryer — Horizontal rotating metallic cylinder, heated internally, intended for the gelatinization and/or drying of starch or other wet material on the outer surface of the cylinder.

3.3.2.17 Fine milling — Second milling process of the raw material in a starch mill using the wet-milling process, with the purpose of disrupting the cellular structure and liberating the starch granules.

3.3.2.18 Flash dryer — Dryer with very rapid action in which the wet material is conveyed by the flow of hot drying air.

3.3.2.19 Fluidification — Treatment consisting of modifying starch in such a way that the starch paste is less viscous than a paste of native starch at the same concentration.

3.3.2.20 Fractionation — Separation of starch, into its individual components, that is, amylose and amylopectin.

3.3.2.21 Free starch — Starch which is separable from cereal fibre by mechanical means during processing, in the presence of water.

3.3.2.22 Free starch (in pulp) — Starch present in potato pulp (and, by extension, in the residual pulp of roots of other plants) which is capable of being extracted by extra washing.

3.3.2.23 Fruit water — Juice from the tubers of the potato plant.

3.3.2.24 Gelatinization temperature (range) — Temperature range at which aqueous suspensions of starch granules pass into the paste form, under specified conditions.

3.3.2.25 Germ cyclone — Hydrocyclone intended for the separation of germ from steeped and coarsely ground maize in aqueous suspension.

3.3.2.26 Germ washing — Removal of residual starch, and gluten from the separated germs by washing with water.

3.3.2.27 Hydrocyclone — Stationary cylindrical conical apparatus for the continuous separation and/or concentration by centrifugal force of the solids from a suspension introduced tangentially under pressure.

3.3.2.28 Hydrolysis — More or less pronounced depolymerization of the starch molecule by the action of water, in the presence of a catalyst (acid or enzyme) bringing about a splitting of the glucosidic bonds present in the molecule (for example, acid or enzymatic hydrolysis).

3.3.2.29 Jet extractor — Continuous centrifugal screening equipment provided with a conical basket on a horizontal axis and a system of rotating washing nozzles, in which the rejected material is moved by centrifugal force along the screen surface.

3.3.2.30 Jet refiner — Jet extractor in which the suspension projected into the conical basket by means of a system of rotating nozzles.

3.3.2.31 Liquefaction — Pronounced fluidification of starch leading to a dissolved or soluble form.

3.3.2.32 Massequite — Thick mixture of crystals of sugars (sucrose, dextrose, etc) and their mother liquors, resulting from the crystallization of a sugar syrup.

3.3.2.33 Mill starch — Aqueous suspension of starch and protein, practically free from fibre, formed as an intermediate product in the manufacture of starch by wet milling.

NOTE — This term is usually used in the maize and rice starch industries.

3.3.2.34 Modification — Changing the properties of native starch by chemical, physical or enzymatic methods.

3.3.2.35 Nozzle centrifuge — Horizontal centrifuge with inlet nozzles directed at the periphery of the bowl.

3.3.2.36 Oil expression — Removal of oil from the germ of the grain by mechanical means.

3.3.2.37 Oil expeller — Press for the extraction of germ oil from cereal germs.

3.3.2.38 Potato rasp — Apparatus consisting of a horizontal, revolving drum with longitudinal toothed blades used to grate tubers (potato) or roots more or less finely to liberate the non-cereal starch granules.

3.3.2.39 Precoat filter — Rotary vacuum filter covered with a filter aid.

3.3.2.40 Rasped potato — Intermediate product in the potato starch mill obtained by the grating of potato tubers.

3.3.2.41 Red water — Liquid extracted from the tubers of the potato plant during the first stage of treatment in starch manufacturing.

3.3.2.42 Refinery liquor — Trade term used in the glucose industry to describe unconcentrated crude or refined liquors arising from the saccharification process.

3.3.2.43 Reversion products — Saccharides formed in the course of hydrolysis of starch by repolymerization of D-glucose units.

3.3.2.44 Rotary vacuum filter — Perforated rotating horizontal drum covered with a filtering surface, generally of cloth, partially immersed in the suspension to be filtered and provided with a system for evacuation.

3.3.2.45 Rotary dryer — Revolving tube in which the product to be dried circulates in contact with hot air or hot gas.

3.3.2.46 Saccharification — Hydrolysis of starch, which ultimately results in the formation of D-glucose.

3.3.2.47 Screen centrifuge — Perforated bowl centrifuge often equipped on the inside with a filter cloth.

3.3.2.48 Screen bend; sieve bend — Static, curved, (bar) screen, used for the removal of particles, for example, fiber and germ, from suspension in a liquid.

3.3.2.49 Separator — Solid bowl centrifuge intended for the separation and/or continuous concentration of solids from a suspension.

3.3.2.50 Separation — Separation of gluten from starch in suspension in water by utilizing the difference in density.

3.3.2.51 Settling tank — Vessel used for the concentration and/or purification by sedimentation of suspensions of starch.

3.3.2.52 Settling tables — Slightly inclined trough used for the deposition of starch with the elimination of protein and/or other lighter impurities.

3.3.2.53 Solvent extraction — Removal of oil from the germ of the grain by means of solvents.

3.3.2.54 Starch milk — Aqueous suspension of starch granules unswollen starch granules.

NOTE — This term in English refers only to unmodified starch (native starch), suspended in water.

3.3.2.55 Steeping — Operation which consists of holding grain intended for the starch mill in an aqueous liquid at a given temperature and acidity in order to soften it and remove soluble substances from it.

3.3.2.56 Steeping tank — Tank, generally cylindrical, in which the steeping of grains is carried out.

3.3.2.57 Steepwater — Unconcentrated liquid which has been used for steeping maize.

3.3.2.58 Torrefaction — Dry heating of starch, usually in the presence of acids, for the production of dextrins.

3.3.2.59 Vertical dryer — Dryer with slowly rotating discs arranged at different levels, with countercurrent flow of the air.

3.3.2.60 Vibrating screen — Screening equipment with a flat sieving surface that oscillates.

3.3.2.61 Wet milling — Wet process of separation of starch from starch-bearing materials.

3.3.3 Auxiliary Materials

3.3.3.1 Alpha-amylase — Enzyme, systematic name 1,4- α -glucan glucanohydrolase, the action of which on starch leads to partial depolymerization by random hydrolysis of its 1,4- α -glucosidic chains.

3.3.3.2 Alpha glucosidase; maltase — Enzyme, systematic name α -D-glycosideglucohydrolase, which hydrolyses α -D-glycosides leading to D-glucose and an alcohol. Maltose is hydrolyzed into two molecules of D-glucose by scission of the 1,4- α -glucosidic linkage.

3.3.3.3 Bacterial enzyme — Generic term indicating enzymes or enzyme complexes produced by bacteria.

3.3.3.4 Beta-amylase — Enzyme, systematic name 1,4- α -D-glucan maltohydrolase which acts on the 1,4- α -D-glucosidic linkages of starch in such manner that maltose units are successively released from the non-reducing ends of the chains.

3.3.3.5 Diastase; malt enzyme — Enzyme complex derived from germinating cereals and containing amylases.

3.3.3.6 Fungal enzyme — Generic term indicating enzymes or enzyme complexes produced by fungi.

3.3.3.7 Gluamylase; *exo*-1, 4- α -glycosidase; glucoamylase; amyloglucosidase; γ -amylase — Enzyme, systematic name 1,4- α -D-glucan glucohydrolase, generally of mould origin, which converts starch completely to D-glucose by the successive removal of D-glucose units from the non-reducing ends of 1,4-linked starch chains, and by hydrolyzing the 1,6- α -branching linkages.

3.3.3.8 Transglucosidase — Enzyme, the action of which on starch hydrolysates results in the formation of revision products.

3.4 Products

3.4.1 Native Starches

3.4.1.1 Arrow-root starch — Arrow-root starch is defined as under:

- a) Starch from the genus *Maranta*; and
- b) Industrial product corresponding to 3.4.1.1 (a) obtained by wet milling from tuberous roots of various species of the genus *Maranta* and in particular of *Maranta arundinacea*.

3.4.1.2 Cereal starch — Cereal starch is defined as under:

- a) Starch contained in the grains of various species of plant belonging to the cereal family; and
- b) Industrial product corresponding to 3.4.1.2 (a) extracted by wet milling from cereal grains.

3.4.1.3 Crystal starch — Native starch produced in long irregular fragments, which may attain several centimeters in length.

NOTE — Crystal starch is generally obtained by the slow drying of moist starch cakes wrapped in paper.

3.4.1.5 Lump starch — Native starch produced in irregular fragments, the dimensions of which are about 1 cm.

3.4.1.6 Maize starch/Corn starch — Maize starch/corn starch is defined as under:

- a) Starch from the species *Zea mays*; and
- b) Industrial product corresponding to 3.4.1.6 (a) obtained by wet milling of certain varieties of the species *Zea mays*.

3.4.1.7 Manioc or cassava starch or tapioca starch — Manioc or cassava starch or tapioca starch is defined as under:

- a) Starch from the species *Manihot utilissima* (*Manihot esculenta*); and
- b) Industrial product corresponding to 3.4.1.7 (a) obtained by wet milling from tuberous roots of the species *Manihot utilissima* (*Manihot esculenta*).

3.4.1.8 Native starch — Starch as obtained by a wet milling process which causes the least possible modification or alteration of the product.

3.4.1.9 Non-cereal starch — Non-cereal starch or tapioca starch is defined as under:

- a) Starch contained in plants other than cereals; and
- b) Industrial product, corresponding to **3.4.1.9** (a), extracted by wet milling usually from tubers, rhizomes or pith.

3.4.1.10 Pearl starch — Native starch in the form of agglomerates of granules.

3.4.1.11 Potato starch or farina — Potato starch or farina is defined as under:

- a) Starch from the species *Solanum tuberosum*; and
- b) Industrial product corresponding to **3.4.1.11** (a) obtained by wet milling from tubers of the species *Solanum tuberosum*.

3.4.1.12 Powdered starch — Sifted native starch that passes completely through a sieve of required size.

NOTE — Modified starches may also be prepared in the powder form, in which the term modified or the term specifying the type of modification should always qualify the term pearl.

3.4.1.13 Rice starch — Rice starch is defined as under:

- a) Starch from various species of the genus *Oryza*; and
- b) Industrial product corresponding to **3.4.1.13** (a) obtained by wet milling of certain species of the genus *Oryza*.

3.4.1.14 Rye starch — Rye starch is defined as under:

- a) Starch from the species *Secale cereale*; and
- b) Industrial product corresponding to **3.4.1.14** (a) obtained by wet milling of certain varieties of the species *Secale cereale*.

3.4.1.15 Sago starch — Rye starch is defined as under:

- a) Starch from the genera *Metroxylon* Rottboel and *Cycas*; and
- b) Industrial product corresponding to **3.4.1.15** (a) obtained by wet milling from pith, mainly of the species *Metroxylon sagu* Rottboel and *Metroxylon rumphii* Martins and in minor quantity of the genus *Cycus*.

3.4.1.16 Sorghum starch or milo starch — Sorghum starch or milo starch is defined as under:

- a) Starch from various species of the genus *Sorghum persoon*; and
- b) Industrial product corresponding to **3.4.1.16** (a) obtained by wet milling of certain species of the genus *Sorghum persoon*.

3.4.1.17 Sweet potato starch — Sweet potato starch is defined as under:

- a) Starch from the species *Ipomoea batatas* Poirlet; and
- b) Industrial product corresponding to **3.4.1.17** (a) obtained by wet milling from tuberous roots of the species *Ipomoea batatas* Poirlet.

3.4.1.18 Waxy starch; glutinous starch — Starch particularly rich in amylopectin obtained from certain cereal cultivars.

NOTE — According to the source, the terms waxy maize starch, waxy rice starch, etc may be used.

3.4.1.19 Wheat starch — Wheat starch is defined as under:

- a) Starch from various species of the genus *Triticum*; and
- b) Industrial product corresponding to **3.4.1.19** (a) obtained by wet milling of certain species of the genus *Triticum*.

3.4.2 Modified Starches

3.4.2.1 Alkyl starch — Starch ether in which some or all of the available hydroxyl groups of the starch have been etherified by alkyl groups.

3.4.2.2 Anionic starch — Modified starch containing groups capable of conferring on the macromolecule a negative charge in aqueous solution under appropriate pH conditions.

3.4.2.3 British gum — A type of dextrin(e), usually yellow or brown in colour resulting from the dry-roasting of starch, either alone or in the presence of added traces of alkali.

3.4.2.4 Carboxymethyl starch — Starch ether in which some or all of the, available hydroxyl groups of the starch have been etherified by carboxymethyl groups.

3.4.2.5 Cationic starch — Modified starch containing groups capable of conferring on the macromolecule a positive charge in aqueous solution under suitable pH conditions.

3.4.2.6 Cross-linked starch; cross-bonded starch — Modified starch in which cross-links between macromolecules have been formed by means of bifunctional or polyfunctional chemical reagents.

3.4.2.7 Dextrin(e) — Modified starch prepared from starch by heat treatment in the dry state, with or without the addition of small quantities of chemical reagents.

NOTE — The use of the term dextrin(e) alone to designate the products resulting from the hydrolytic or enzymatic depolymerization of starch is deprecated.

3.4.2.8 Dialdehyde starch — A product obtained by oxidation of starch under specific conditions, generally with the aid of periodic acid or periodates, which contains a substantial proportion of adjacent aldehyde groups on carbon atoms 2 and 3.

3.4.2.9 Di-starch glycerol — Cross-linked starch in which certain starch hydroxyl groups have been etherified by glycerol chains, generally by means of epichlorohydrin.

3.4.2.10 Di-starch phosphate — Starch phosphate with cross-linking.

3.4.2.11 Lintner starch — Thin boiling starch (for starch paste) used in the laboratory as a colorimetric indicator obtained by moderate treatment of starch with dilute hydrochloric acid which retains the ability to give a blue colour in the presence of iodine.

3.4.2.12 Modified starch — Native starch treated in such a way as to modify one or more of its original physical or chemical properties.

3.4.2.13 Mono-starch phosphate — Starch phosphate without cross-linking.

3.4.2.14 Oxidized starch — Modified starch obtained by the oxidation of a native starch.

3.4.2.15 Pre-gelatinized starch — Modified starch obtained by drying a starch paste with or without the addition of chemical reagents, and having the property of marked swelling on contact with cold water or giving a colloidal dispersion.

3.4.2.16 Sago — Partially gelatinized product in the form of granules, pearls or flakes obtained by mechanical treatment under the influence of heat from sago starch in the presence of water.

3.4.2.17 Starch acetate — Starch ester in which some or all of the available hydroxyl groups of the starch, have been esterified by acetyl groups.

3.4.2.18 Starch adipate — Starch ester in which some or all of the available hydroxyl groups of the starch have been esterified by adequate groups with or without cross-linking.

3.4.2.19 Starch ester — Modified starch in which some or all of the available hydroxyl groups of the starch have been esterified.

3.4.2.20 Starch ether — Modified starch in which some or all of the available hydroxyl groups of the starch have been etherified.

3.4.2.21 Starch gel — Aqueous dispersion of gelatinized starch with visco-elastic properties.

3.4.2.22 Starch laurite — Starch ester in which some or all of the available hydroxyl groups of the starch have been esterified by laurite groups.

3.4.2.23 Starch nitrate — Starch ester in which some or all of the available hydroxyl groups of the starch have been esterified by nitrate groups.

3.4.2.24 Starch phosphate — Starch ester in which some or all of the available hydroxyl groups of the starch have been esterified by phosphate groups with or without cross-linking.

3.4.2.25 Starch succinate — Starch ester in which some or all of the available hydroxyl groups of the starch have been esterified by succinate groups with or without cross-linking.

3.4.2.26 Starch sulphate — Starch ester in which some or all of the available hydroxyl groups of the starch have been esterified by sulphate groups.

3.4.2.27 Starch xanthate — Starch ester in which some or all of the available hydroxyl groups of the starch have been esterified by xanthate groups, generally by the action of carbon disulphide in an alkaline medium.

3.4.2.28 Thick-boiling starch — A native starch or modified starch with retained or increased viscosity according to treatment.

3.4.2.29 Thin-boiling starch (for starch paste) — Modified starch insoluble in cold water, the paste of which when warm is more fluid than the paste of native starch in equal concentration.

3.4.2.30 White dextrin(e) — Dextrin(e) closely resembling the corresponding native starch in whiteness.

3.4.2.31 Yellow dextrin(e); canary dextrin(e) — A type of dextrin(e) produced by dry roasting in the presence of a small quantity of acid.

3.4.3 Hydrolysis Products

3.4.3.1 Cyclodextrin — Grouping in toroidal form of at least 6 anhydroglucose linkages α -1,4 and resulting from the action on starch of enzymes produced by certain bacteria (such as *B. macerans*).

3.4.3.2 Dextrose — D-glucose obtained by the complete hydrolysis of a starch followed by purification and crystallization.

NOTE — Dextrose can be obtained either in hydrous or monohydrate form.

3.4.3.3 Dried glucose syrup — Glucose syrup from which the water has been partially removed.

3.4.3.4 Gentiobiose — 1,6- β -glucosido-glucose which is formed as a reversion product during the acid hydrolysis of starch.

3.4.3.5 Glucose syrup — Purified concentrated aqueous solution of nutritive saccharides obtained from starch.

3.4.3.6 Isomaltose — 1,6- α -glucosido-glucose obtained by enzymatic hydrolysis of starch. It is also formed as a reversion product during the acid hydrolysis of starch.

3.4.3.7 Maltodextrin(e) — Product containing a significant proportion of maltose prepared by enzymatic hydrolysis of starch.

3.4.3.8 Malto-oligosaccharide — Maltosaccharide containing up to about 10 anhydroglucose units.

3.4.3.9 Maltotetraose — Maltosaccharide containing 4 anhydroglucose units.

3.4.3.10 Maltotriose — Maltosaccharide containing 3 anhydroglucose units.

3.4.3.11 Solid glucose — Mixture of D-glucose, maltose and other polymers of D-Glucose of low molecular weight, obtained by nearly complete hydrolysis of starch, followed by solidification by crystallization.

3.4.3.12 Starch hydrolysis — Product obtained by acid, enzyme or combined hydrolysis of starch consisting of lower molecular mass polysaccharides, oligosaccharides and/or monosaccharides.

3.4.3.13 Starch hydrolysis products — Generic name for products such as glucose syrup and dextrose.

3.4.4 Other Products

3.4.4.1 Caramel colour — Product obtained exclusively by heating edible sugars or amorphous, water-soluble, brown coloured product obtained by the controlled action of heat on edible sugars in the presence of one or more chemical compounds.

3.4.4.2 Corn steep liquor — Commercial term for the viscous liquid obtained by low temperature concentration of the liquid which has been used for steeping maize.

3.4.4.3 Devitalized wheat gluten — Industrial product consisting of wheat gluten which has irreversibly lost its cohesive and elastic properties.

3.4.4.4 Fiber — Term applied in the starch industry to the mainly cellulosic material obtained from husks when treated to remove as much as possible of the adherent starch.

3.4.4.5 Germ — Commercial and industrial term used by the starch industry to designate the embryo of the caryopses.

3.4.4.6 Germ oil — Oil obtained from the germ of certain cereals.

3.4.4.7 Gluten — Usual name for the water-insoluble protein complex extractable from cereal grains.

3.4.4.8 Hydrol — The mother liquor remaining after the removal of the crystals from a dextrose masseccuite.

3.4.4.9 Maize germ cake — Residue left after the removal of the oil from maize germ.

3.4.4.10 Maize gluten — Maize gluten is defined as under:

- a) The usual name for the water insoluble protein complex from maize; and
- b) Industrial product corresponding to **3.4.4.10** (a) obtained by wet milling of maize starch.

3.4.4.11 Maize gluten feed — The commercial product, obtained by the wet milling of maize, containing fiber, gluten, starch, and a small amount of oil.

3.4.4.12 Maize gluten meal — The commercial product obtained by the wet milling of maize, with the same components as maize gluten feed but richer in gluten.

3.4.4.13 Milo (sorghum) gluten — Milo (sorghum) gluten is defined as under:

- a) The usual name for the water insoluble protein complex from sorghum; and
- b) Industrial product corresponding to **3.4.4.13** (a) obtained by wet milling of sorghum starch.

3.4.4.14 Moulding starch — Starch, with or without small amounts of additives (generally oil or fat) used in the confectionery industry as a casting mould for deposited goods (for example, fondants, gums, etc).

3.4.4.15 Potato pulp — By-product from the extraction of potato starch, consisting mainly of fragments of cell walls and residual starch.

3.4.4.16 Starch based powdered adhesive — A product in the dried form, based on native or modified starch and used for adhesive purposes.

3.4.4.17 Starch derived liquid adhesive — Liquid or paste used as adhesive, made from native starch, modified starch, or flours.

3.4.4.18 Rice gluten — Rice gluten is defined as under:

- a) The usual name for the water insoluble protein complex from rice; and
- b) Industrial product corresponding to **3.4.4.18** (a) obtained by wet milling of rice starch.

3.4.4.19 Vital wheat gluten — Industrial product consisting of wheat gluten and having, in the hydrated or rehydrated state, cohesive and elastic properties.

3.4.4.20 Wheat gluten — Wheat gluten is defined as under:

- a) The usual name for the water-insoluble protein complex from wheat; and
- b) Industrial product corresponding to **3.4.4.20 (a)** obtained by wet milling of wheat starch.

3.4.4.21 Zein — The prolamin of maize and/or technical prolamin extracted industrially from maize grains soluble in aqueous alcohol.

3.5 Analytical Terms

3.5.1 Alkali Numbers — The amount of alkali (expressed in milliliters of 0.1 N sodium hydroxide) consumed by a given mass of starch (native or modified) when it is treated under defined conditions.

3.5.2 Cold Water Solubility (Measurement of) — Determination of the proportion of a starch (native or modified) value passing into solution in cold water under defined conditions.

3.5.3 Colour (Measurement of) — Determination of the colour intensity of a starch hydrolysis product by following methods:

- a) by comparison with reference standards; and
- b) by measurement of the absorbance using a spectrophotometer under defined conditions.

3.5.4 Colour Stability (Measurement of) — Determination of the change in colour of a starch hydrolysis product when maintained under defined conditions.

3.5.5 Crude Fiber (Mainly Insoluble Cellulosic Material) — Residue of cellulosic origin obtained after treatment of the raw materials of the starch industry, starches, their derivatives and by-products, under defined analytical conditions.

3.5.6 Dextrose Equivalents (DE) — Reducing power of a starch hydrolysate expressed as D-glucose on the dry basis.

3.5.7 Fine Fiber — Fine material mainly cellulosic in character pertaining to the original raw material and present in the starch.

3.5.8 Iodine Affinity — Measure of the ability of starches to absorb iodine by complex formation.

3.5.9 Maltose Equivalents (ME) — Reducing power of a starch hydrolysate expressed as maltose on the dry basis.

3.5.10 Reducing Power (of a Carbohydrate) — Property possessed by certain carbohydrates of losing electrons because of the presence in the molecules of a carbonyl function. This property can be detected, for instance, by the reduction of metallic salts in alkaline medium. If measurements are carried out under determined conditions, the results can be expressed in dextrose equivalent value.

3.5.11 Specks — Spots or marks visible under specified conditions of examination of starch.

3.5.12 Strength (Measurement of) — Determination of the resistance to deformation of a starch gel, under defined conditions

3.5.13 Titratable Acidity — The amount of alkali (expressed in milliliters of 0.1 N sodium hydroxide) necessary to neutralize 10 g of starch (native or modified) or starch hydrolysis product under defined conditions.

3.5.14 Water-Binding Capacities (Measurement of) — Determination of the amount of water which an insoluble starch (native or modified) is able to hold in relation to its own mass.

3.5.15 Whiteness (Measurement of) — Determination of the light reflectance of a starch surface compared with that of a standard white surface under defined conditions.

ANNEX A

(Foreword)

COMMITTEE COMPOSITION

Foodgrains, Allied Products and Other Agricultural Produce Sectional Committee, FAD 16

<i>Organization</i>	<i>Representative(s)</i>
Directorate of Marketing and Inspection, Ministry of Agriculture, New Delhi	SHRI P. K. SWAIN (AGRICULTURE MARKETING) (Chairman)
All India Food Processors' Association, New Delhi	SHRI KRISHNA KUMAR JOSHI SHRIMATI KAMIA JUNEJA (<i>Alternate</i>)
Central Food Technological Research Institute (CFTRI), Mysore	DR M. S. MEERA DR V. B. SASHIKALA (<i>Alternate</i>)
Centre of Excellence for Soybean Processing, CIAE, Bhopal	DR PUNIT CHANDRA DR S. K. GIRI (<i>Alternate</i>)
Central Institute of Post-Harvest Engineering and Technology (CIPHET), Ludhiana	HEAD (DIVISION OF TRANSFER OF TECHNOLOGY) DR D. N. YADAV (<i>Alternate</i>)
Central Tuber Crop Research Institute (CTCRI), Thiruvananthapuram	DIRECTOR DR M. S. SANJEEV (<i>Alternate</i>)
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Consumer Education & Research Centre, Ahmedabad	SHRIMATI DOLLY A. JANI DR ANINDITA MEHTA (<i>Alternate</i>)
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Consumer Research, Education, Action, Training and Empowerment (CREATE), Tamil Nadu	SHRI K. SURESH KANNA SHRI R. PONNAMALAM (<i>Alternate</i>)
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Directorate of Marketing and Inspection, Faridabad	DY AGRICULTURAL MARKETING ADVISOR SMO (STD) (<i>Alternate</i>)
Directorate of Plant Protection Quarantine and Storage, Faridabad	PLANT PROTECTION ADVISER SHRI R. V. SINGH (<i>Alternate</i>)
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Food Safety and Standards Authority of India, New Delhi	MISS APRAJITA VERMA
G B Pant University, Food Science Division, Pant Nagar	DR SATISH K. SHARMA DR SWETA RAI (<i>Alternate</i>)

<i>Organization</i>	<i>Representative(s)</i>
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Indian Institute of Food Processing Technology (IIFPT), Thanjavur	DR C. ANANDHARAMAKRISHNAN
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National Rice Research Institute, Cuttack	DR AWADHESH KUMAR DR (SHRIMATI) PADMINI SWAIN (<i>Alternate</i>)
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Member Secretary

MISS LAVIKA SINGH
SCIENTIST 'B' (FAD), BIS

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